[Second Edition.]

PATENT SPECIFICATION

544,732

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PROVISIONAL SPECIFICATION

Improvements relating to Reinforced Rubber Packing Washers, Discs, Gaskets and Oil Seals.

We, GEORGE ANGUS AND COMPANY LIMITED, a British Company, and ANTHONY PROCTER, British Subject, both of Angus House, 152—158, Westgate Road, Newcastle-upon-Tyne, 1, do hereby declare the nature of this invention to be as follows :—

This invention relates to moulded rubber packing washers, such as **U**, cup and hat washers, rubber packing discs, rubber gaskets, and rubber oil seals, reinforced with an internal core of stiff material, such as a plate of metal or synthetic resin. The object of the invention is so to position the stiff core in the mould that such core will become embedded in the rubber.

For the above purpose, according to the invention, in moulding a rubber packing member reinforced by a stiff core, one or more layers of rubber-impregnated material is interposed between the core and a surface of the mould so as to space the core away from such surface.

Usually nowadays, especially for oil seals, the rubber from which the packing member is moulded in an oil-resisting synthetic rubber, and the expression rubber is intended to include both synthetic and natural rubber.

For a flat rubber packing washer, disc or gasket, the core may be a flat disc of metal or synthetic resin, annular or not as the case may be. With such a core one or more layers of rubber-impregnated material, for instance canvas or other woven fabric or even paper, is placed in the mould cavity, the core is placed thereon and the rubber dough is placed on the core. The whole is then moulded and vulcanised in the closed mould under pressure and heat. The rubber-impregnated spacing material may be bedded on rubber dough previously placed in the mould.

The fabric or paper can be impregnated with rubber in the form of an aqueous dispersion or solution.

The stiff core disc may be faced on both faces with rubber-impregnated material or may even be completely enwrapped therewith.

The flat core may be annularly or otherwise ridged on one or both faces.

For a **U**, cup or hat washer, the core is embedded in the base of the washer and may have a flange extending into or towards each rubber flange of the washer.

Oil seals are annular washers usually having an axially directed flexible sealing flange at one periphery, and are held by the other periphery as a press fit in a shaft housing or on a machine shaft, or in a sheet metal casing. The holding portion and the next portion connecting same to the axially directed sealing flange of such an oil seal, may be an annulus of **L** cross section presenting one limb as an axially directed flange for effecting the press fit. By an internal metal or synthetic resin annular core of **L** or other thin cross section, the holding portion of the oil seal may be sufficiently stiffened to be capable of maintaining a press fit without being massive. Such core can be positioned in the mould so as to become coated with rubber on both faces and on its edges, by one or more layers of rubber-impregnated material interposed between the core and the respective surfaces of the mould, or by completely enwrapping the core in the rubber-impregnated material. Similarly, a massive annular core may be located in a large mould cavity for forming a massive holding portion or flange on an oil seal by enwrapping the core in rubber-impregnated material. In either case, all the rubber embedding the core may be provided by the rubber-impregnation of the fabric or paper.

Dated this 14th day of February, 1941.

PHILLIPS & LEIGH,
Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements relating to Reinforced Rubber Packing Washers, Discs, Gaskets and Oil Seals.

We, GEORGE ANGUS AND COMPANY LIMITED, a British Company, and ANTHONY PROCTER, British Subject, both of Angus House, 152—158, Westgate Road, Newcastle-upon-Tyne, 1, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

This invention relates to moulded rubber packing washers, such as U, cup and hat washers, rubber packing discs, rubber gaskets, and rubber oil seals, reinforced with an internal core of stiff material, such as a plate of metal or synthetic resin. The object of the invention is so to position the stiff core in the mould that such core will become embedded in the rubber.

For the above purpose, according to the invention, in moulding a rubber packing member reinforced by a stiff core, one or more layers of rubber impregnated fabric is interposed between the core and a surface of the mould so as to space the core away from such surface.

Usually nowadays, especially for oil seals, the rubber from which the packing member is moulded is an oil-resisting synthetic rubber, and the expression rubber is intended to include both synthetic and natural rubber.

The rubber-impregnated fabric is for instance canvas or other woven or felted fabric or even paper.

The fabric can be impregnated with rubber in the form of an aqueous dispersion or a solution.

The rubber-impregnated spacing fabric is placed in the mould cavity, the core is placed thereon, and, when necessary, rubber dough is placed on the core.

The core may be faced on both faces with rubber-impregnated fabric.

Alternatively the core may be enwrapped in the rubber-impregnated fabric, which may supply substantially all the rubber required to form the moulded rubber packing member, or a base or other distinct part thereof.

For a flat rubber packing washer, disc or gasket, the core may be a flat disc of metal or synthetic resin, annular or not as the case may be, and may be annularly or otherwise ridged on one or both faces.

For a U, cup or hat washer or oil seal, the core which is embedded in the base of the washer may have a flange extending into or towards each rubber flange of the washer.

The filled mould is closed and, as usual, subjected to heat to vulcanise the rubber content, usually whilst the mould is held closed in a press.

The rubber-impregnated spacing fabric may be bedded on rubber dough previously placed in the mould.

Representative examples of rubber packing members which have cores positioned in the above manner in the moulds in which the rubber packing members have been formed, are illustrated on the accompanying drawings, in which :—

Fig. 1 is a radial section of half a round cored rubber packing ring of circular cross section.

Fig. 2 is a similar view of a rubber packing ring of rhomboid cross section having a core of Tee cross section.

Fig. 3 is a similar view of a flat annular rubber washer having a flat annular core.

Fig. 4 is a similar view of a flat annular rubber washer having a flat annular core annularly ribbed on both faces.

Fig. 5 is a similar view of a U washer having a flat annular core.

Fig. 6 is a similar view of a U washer having a flanged annular core.

Fig. 7 is a similar view of a cup washer having an annularly ribbed and flanged annular core.

Fig. 8 is a similar view of a hat washer having an annularly ribbed flat annular core.

Figs. 9, 10 and 11 are similar views of internal one-piece oil seals.

Fig. 12 is a similar view of an external oil seal.

Fig. 13 is a similar view of an internal oil seal having a synthetic resin core fused and set simultaneously with the vulcanisation of the rubber.

Fig. 14 is a half axial section of a mould with an oil seal moulded therein.

Referring to Fig. 1 which shows a round cored round rubber ring, the metal or synthetic resin core *a* is positioned in the mould (similar to the mould s^1 *s* shown in Fig. 14) during the moulding of the rubber ring *b*, by means of rubber-impregnated fabric *c* entirely enwrapping the core *a*. The whole of the rubber of the ring *b* is provided by the rubber impregnation of the fabric *c*.

In forming the rubber ring *d* of rhom-

boid cross section shown in Fig. 2, an annular core *e* of Tee cross section has been positioned in the mould, by layers of rubber-impregnated fabric *c*, placed on the mould surface, and the core *e* placed on the fabric *c*, and sufficient rubber dough to form the remainder of the rubber ring *d* has been inserted in the mould over and around the sides of the core *e*.

Fig. 3 shows a flat annular rubber washer *f* having a flat annular core *g* positioned therein during moulding by the core being enwrapped in rubber-impregnated fabric *c*.

The flat annular core *g* of the flat annular rubber washer *f* shown in Fig. 4 has likewise been enwrapped in rubber-impregnated fabric *c*, but the core *g* presents annular ridges g^1 on both faces which space the core *g* away from the mould surface, and therewith from the exterior of the rubber washer *f*, additionally to the spacing effected by the intervening fabric *c*.

In Fig. 5 a U washer *h* is shown having a flat annular core *g* enwrapped in rubber-impregnated fabric *c* embedded in the base, on which rubber dough has been placed to build-up the two flanges h^1.

In Fig. 6 the U washer *h* has a core *i* of channel cross section presenting flanges i^1 directed towards the flanges h^1 of the U washer. The outer surfaces of the channel core *i* are provided with rubber-impregnated fabric *c* to position the core *i* in the mould.

With the cup washer *j* shown in Fig. 7, the annular core *k* has an annular rib k^1, and a flange k^2 directed towards the flange j^1 of the cup washer *j*. The whole of this core *k* is enwrapped in rubber-impregnated fabric *c*.

The hat washer *l* shown in Fig. 8 has a flat annular core *g*, formed with an annular rib g^1 and enwrapped in rubber-impregnated fabric *c*, l^1 is the sealing flange.

Figs. 9 to 12 show oil seals with cores positioned by means of rubber-impregnated fabric *c*. Oil seals are annular washers usually, as shown, having an axially directed flexible sealing flange *m* at one periphery, and are held by a holding portion *n* at the other periphery as a press fit in a shaft housing or on a machine shaft, or in a sheet metal casing. The holding portion *n* and neck portion *o* connecting the holding portion *n* to the axially directed sealing flange *m*, constitute, in the examples shown in Figs. 9, 10 and 12, an annulus of L cross section presenting one limb *n* as an axially directed flange for effecting the press fit. In the example shown in Fig. 11, which is a doubly lipped oil seal having two oppositely axially directed flexible sealing flanges *m*, the neck *o* and holding portion *n* constitute an annulus of Tee cross section. An internal metal or synthetic resin annular core *p* of L cross section, or pair of back to back cores *p*, Fig. 11, is positioned in the holding portion *n* and neck portion *o* of each of the oil seals. This is effected in the oil seal shown in Fig. 9 by layers of rubber-impregnated fabric *c* interposed between the core *p* and the surface of the mould. In Fig. 9 the core *p* also extends somewhat along the flexible sealing flange *m*. In the constructions of oil seal shown in Figs. 10, 11 and 12, the core *p* or pair of cores *p*, is positioned by being enwrapped with rubber-impregnated fabric *c*. The rubber of the holding, press fitting, portions *n* of these oil seals is substantially entirely provided by the rubber impregnation of the fabric *c*, little, if any, rubber dough being added. The sealing flanges *m* are, of course, formed from rubber dough.

Fig. 13 shows an oil seal having an annular synthetic resin core *q* in its massive holding portion *n*. To form this core *q* and position it in the mould, an annular wad of compressed synthetic resin moulding powder is wrapped in sufficient rubber-impregnated paper or other rubber-impregnated fabric practically completely to fill the respective portion of the mould, and the rubber of the oil seal is vulcanised simultaneously with the fusing and setting by heat of the synthetic resin of the core *q*. Little if any additional rubber dough is required to complete the holding portion *n* of this oil seal.

The examples of oil seals shown in Figs. 9, 10, 11 and 13 are internal oil seals so-called because their flexible sealing flanges *m* are on the inner periphery, whereas the example shown in Fig. 12 is an external oil seal, the flexible sealing flange *m* of which is on the outer periphery.

r is the usual garter spring which is seated against the flexible sealing flange *m* of the oil seal. The garter spring *r* of an internal oil seal, Figs. 9, 10, 11 and 13, is in tension and presses the flexible sealing flange *m* radially inwards against a moving shaft, whilst the holding portion *n* is a press fit in a stationary machine part. On the contrary the holding portion *n* of an external oil seal, Fig. 12, is a press fit on a rotary shaft, and the garter spring *r* thereof is in compression and forces the flexible sealing flange *m* radially outwards against a stationary machine part.

An oil seal constructed as described in connection with Fig. 10 is shown in Fig. 14 in the steel mould, in which it is produced and vulcanised. This mould as

usual consists of a base member s^1 and a cover member s^2, positioned on the base member s^1 by steel locating pins t.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is :—

1. In moulding a rubber packing member reinforced by a stiff core, a method of positioning the core, consisting in interposing one or more layers of rubber-impregnated fabric between the core and a surface of the mould so as to space the core away from such surface.

2. A method as set forth in claim 1, in which the core is enwrapped in the rubber-impregnated fabric.

3. A method as set forth in claim 2, in which the rubber-impregnated fabric supplies substantially all the rubber required to form the moulded rubber packing member, or a base or other distinct part thereof.

4. A moulded rubber packing member reinforced with an internal core of stiff material, positioned by the method set forth in any of the foregoing claims.

5. A **U**, cup, hat or flat annular rubber washer reinforced by an annular core of stiff material positioned by the method set forth in any of claims 1 to 3.

6. A rubber oil seal having a holding portion reinforced by a stiff core positioned by the method set forth in any of claims 1 to 3.

7. A rubber **U**, cup or hat washer or oil seal as set forth in claim 5 or 6, in which the stiff core presents a flange or flanges extending into or towards the sealing flange or flanges of the washer or oil seal.

8. A rubber packing member as set forth in any of claims 4 to 7, in which the core is ribbed on the surface thereof contacted by the positioning fabric.

9. The improved rubber packing members, washers and oil seals reinforced by stiff cores positioned by rubber-impregnated fabric substantially as described and illustrated by the accompanying drawings.

Dated this 8th day of December, 1941.

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Agents for the Applicants.

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544,732 COMPLETE SPECIFICATION

2nd Edition

SHEET 1

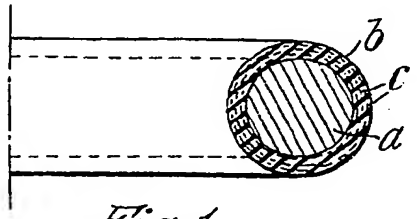


Fig. 1.

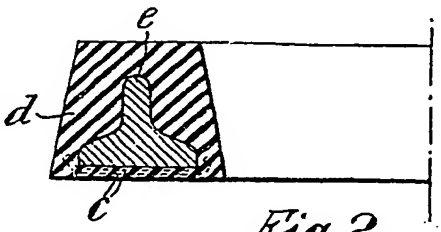


Fig. 2.

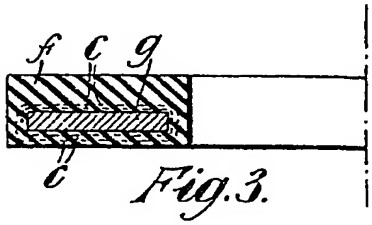


Fig. 3.

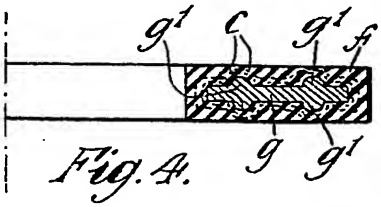


Fig. 4.

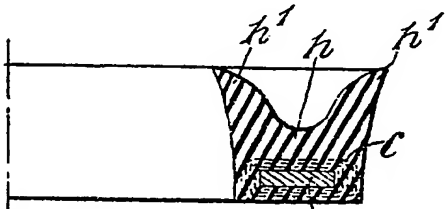


Fig. 5

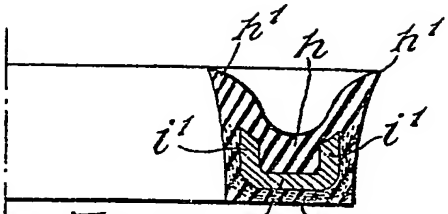


Fig. 6

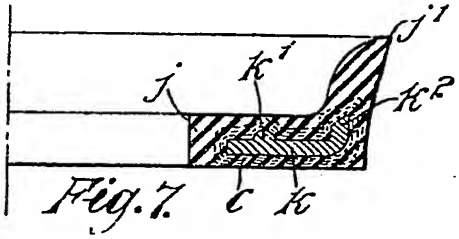


Fig. 7.

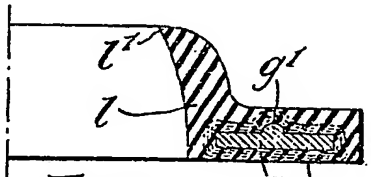


Fig. 8

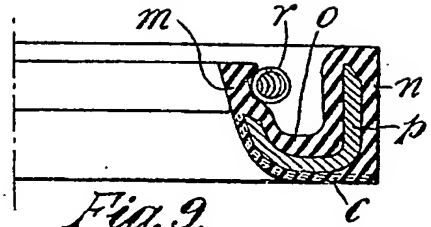


Fig. 9.

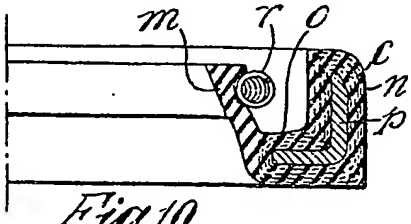


Fig. 10.

[This Drawing is a reproduction of the Original on a reduced scale.]

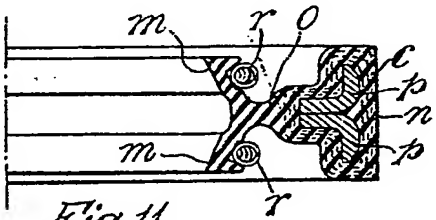


Fig. 11.

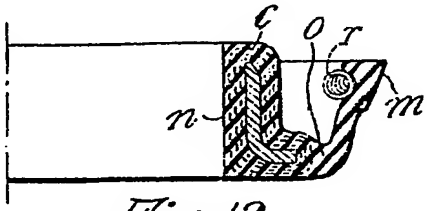


Fig. 12.

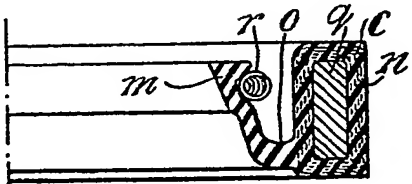


Fig. 13.

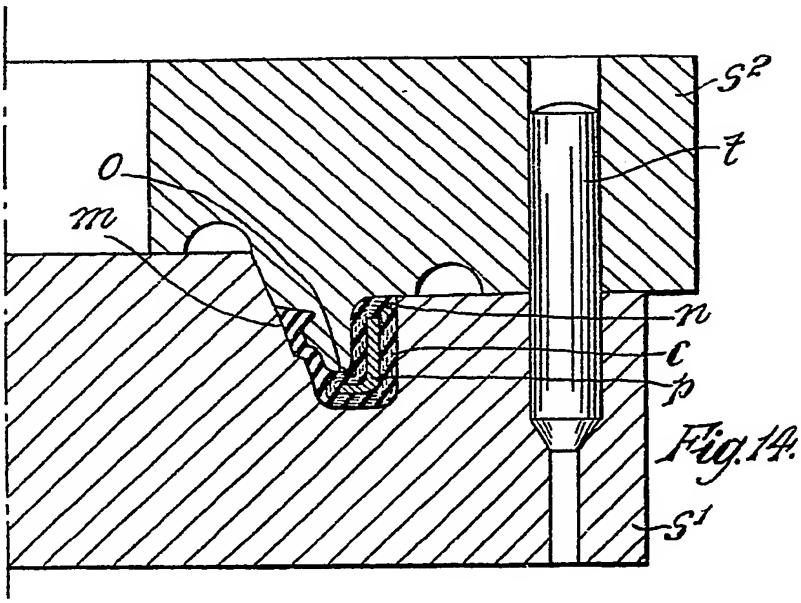
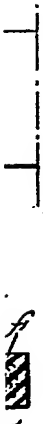
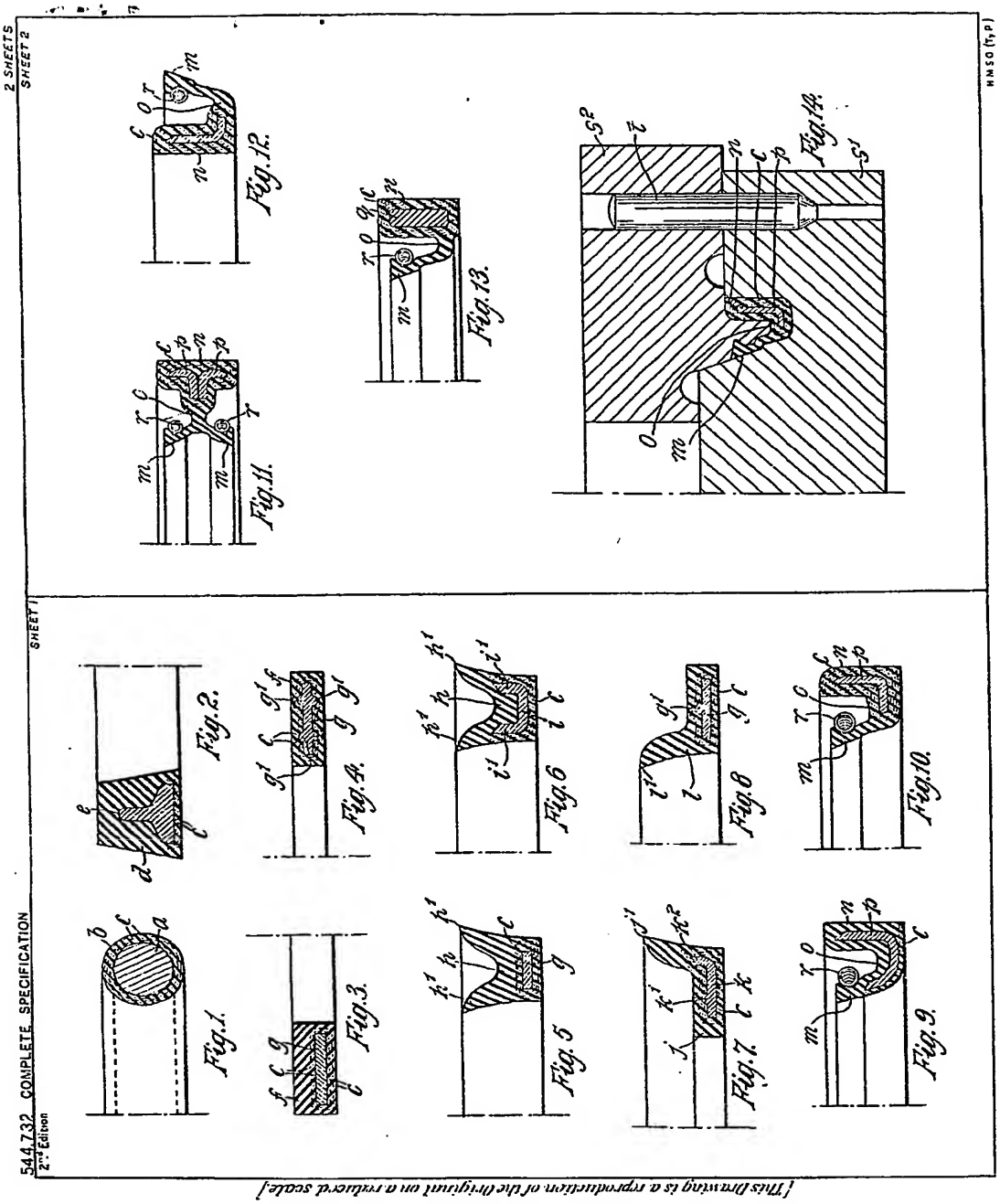


Fig. 14.





[This Drawing is a reproduction of the Original on a reduced scale.]